

ABSTRACT OF THE DISCLOSURE

A method for determining concentrations of naturally occurring radioactive elements in earth formation by analysis of gamma ray energy spectra measured by at least
5 one gamma ray detector while the borehole is being drilled. Gain of the gamma ray detector is controlled automatically through analysis of the spectra. The one or more gamma ray detectors are disposed at the periphery of the downhole instrumentation to maximize sensitivity. Elemental concentrations of naturally occurring radioactive elements such as potassium, uranium and thorium are measured either as a function of
10 depth in the borehole, or as a function of aximuthal sectors around the borehole wall, or as a function of both depth and azimuthal sectors.